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characterize the effrontery of such proceedings in fitting terms, but forbear, believing that with a little change of scene the author of them will be as glad to bury them in oblivion as is the writer of this notice.

EXPLANATION OF PLATES.

PLATE 4. Front view of cranium of *Loxolophodon cornutus*, one-sixth natural size.

PLATE 5. Profile of the same (not in natural position) same proportion; compare with description.

NEW PLANTS OF NORTHERN ARIZONA AND THE REGION ADJACENT.

BY SERENO WATSON.

IN the botanical collections made in 1871-'72, mainly in the southern portion of the Great Basin, in northwestern Arizona and the adjacent desert section of California, by Mr. Ferd. Bischoff and others, under the direction of Lieut. G. M. Wheeler, Corps of Engineers, in the course of his exploration of that region, several new species have been found which are here described, by consent, in anticipation of the fuller report now in preparation. With these are given some others occurring in a small collection made by Mrs. Ellen P. Thompson near Kanab, Southern Utah, during the last summer while accompanying her brother, Maj. Powell, in his survey of the Colorado. Several of these species are of interest as confirming genera hitherto monotypical. Notes upon a few other species are added.

POLYGALA SUBSPINOSA.—Perennial, herbaceous, glabrous or more or less pubescent; stems 2-8' high, branched above, the branches often spinose; leaves scattered, $\frac{1}{2}$ to 1' long, oblong or oblanceolate, acute or obtuse, attenuate to the base; raceme loose, few-flowered; bracts small and scarious; pedicels becoming reflexed, shorter than the flowers; sepals naked or ciliate, the wings oblong, 4-5" long and equaling the petals; keel hooded, crested with a broad saccate process; style linear; capsule orbicular, emarginate, short-stipitate.—Near *P. Nutkana*, which has a linear or horn-shaped crest and is always nearly or quite glabrous and without spines. Silver City, Nevada (Kellogg, 1862), pubescent and very spiny; Arizona (Palmer), densely pubescent but without spines; Kanab (Mrs. E. P. Thompson), glabrous and spiny. Flowers "maroon and yellow;" on mountain summit; June.

PETALOSTEMON FLAVESCENS.—Stem simple, glabrous; stipules and leaves sparingly silky; leaflets 3-5, narrowly oblong, obtuse, 3-6" long; spike dense, long-peduncled, the rachis subpubescent; bracts (and calyx) very silky-villous, subulate, 2" long; upper tooth of the calyx subulate, narrowest and longest, equaling the tube; petals yellow, the limb of the banner quadrilateral, emarginate, equaling the claw, the

other petals narrowly oblong.—Kanab, Southern Utah (Mrs. E. P. Thompson), on dry rocky hills; June. *P. macrostachyus*, Torr., a somewhat similar, more northern species, with elongated spikes of white flowers, has 5–9 acute glabrous leaflets, the rachis, bracts and calyx very villous, the subulate bract long-acuminate, calyx-teeth equaling the tube, and the claw of the banner much exceeding the small deltoid-subcordate irregularly crenate limb.

In the collection from Kanab is another well-marked form, but probably referable to *P. Searlsiae*, Gray—differing in the broad naked bract, rhomboidal above with a short filiform apex, attenuate to the base; calyx equally villous throughout; petals larger and broader, the banner entire or emarginate instead of erosely crenate. *P. ovatus*, Dougl., from Oregon, with violet flowers, is distinct from *P. macrostachyus*, to which it has been referred. There are other western species as yet undescribed.

DALEA AMGENA.—Shrubby, much branched; pubescence short, silky, dense only in the upper axils; leaflets 7–11, narrowly linear, 3–4" long, obtusish; flowers loosely racemed, few, large, deep-purple; pedicels 1" long; calyx pubescent, 3–5" long, the lanceolate acuminate teeth equaling the tube; petals 6" long; ovary densely pubescent.—Allied to *D. Fremontii*, *Johnsoni* and *Schottii*. Northern Arizona (Mrs. E. P. Thompson). In damp places; April.

ASTRAGALUS AMPULLARIUS. (§ *Inflati*).—Stems short, ascending; pubescence short, strigose, appressed; leaflets 7–11, obovate, 4–6" long, emarginate, glabrous above; raceme short, $\frac{1}{2}$ –1' long, rather dense; calyx cylindrical-campanulate, 2–3" long, the teeth very short or nearly obsolete; petals purple, the banner narrow, 7–9" long, much exceeding the very obtuse keel; legume ascending, upon a long-exserted stipe, oblong, 9" long, glabrous.—Kanab, Southern Utah (Mrs. E. P. Thompson). In damp places; April, May.

PETERIA THOMPSONÆ.—More or less hoary with short appressed hairs; stems herbaceous, 1' high or more; leaflets 6–10 pairs, obovate, 4–6" long, obtuse, mucronulate; raceme dense; bracts linear-setaceous; calyx densely glandular-pubescent, the subulate teeth about equaling the tube and slightly shorter than the light-yellow corolla; banner orbicular, 6" long; ovary sessile; pod 2' long, 2" wide, glabrous, about 6-seeded.—Stipules spinose as in the original species, not subulate as described by Benthams and Hooker. The base of the style in both species is thickened and somewhat horny. Kanab (Mrs. E. P. Thompson). On dry rocky cliffs; July, August.

WHIPPLEA UTAHENSIS.—Shrubby, low (6' high), much branched; pubescence strigose, mostly appressed; leaves oblong, attenuate to a very short petiole, 3–5" long, acutish, entire, sparingly hairy, 3-nerved; flowers small, few, on very short pedicels, in a dense compound cyme; calyx cylindrical-turbinate, the subulate lobes shorter than the white oblong clawed petals; stamens 10; styles 3 and ovary 3-celled; capsule oblong, terete, $1\frac{1}{2}$ " long, adherent for half its length to the calyx-tube.—Especially distinguished from *W. modesta* by its elongated capsule. Bud-scales very silky. Kanab (Mrs. E. P. Thompson). On dry sandy cliffs; August.

CENOTHERA (CHYLISMA) MULTIJUGA.—Annual, glabrous, branched; radical leaves 6' long, narrow, pinnate with 12 or more pairs of leaflets, which are 9" long, the alternate ones smaller, oblong, acute, irregularly and doubly toothed, strongly veined, the terminal leaflet not larger; raceme loose; pedicels slender, $1\frac{1}{4}$ " long, equaling the filiform angular ovary; calyx-tube 1– $1\frac{1}{2}$ " long, much shorter than the segments; petals yellow, 4" long.—Near *C. scirpoides*, Nutt., but none of the forms of that variable species shew any approach to this in the regular pinnation and peculiar serration of the leaves. Northern Arizona (Mrs. E. P. Thompson). In dry places; March.

PETALONYX NITIDUS. Leaves ovate, $\frac{1}{2}$ –1' long, acute, coarsely toothed, shortly petioled, vitreous and shining, not greatly reduced on the branches; flowers in contracted cymose panicles; otherwise like *P. Thurberi*.—Southern Nevada (Wheeler).

CYMOPTERUS PURPUREUS.—Subcaulescent, glabrous; leaves 2–3-pinnate, broadly triangular in outline, 2–4' long including the petiole, the broad segments coarsely mucronate-dentate; peduncle stout, exceeding the leaves; umbel unequally 8–12-rayed, naked or with a single involucrel bract; involucels unilateral, of several lanceolate segments united near the base, nearly equaling the flowers; sepals ovate, acute; petals yellowish-purple; fruit 4" long, nearly as broad, with wide membranous wings, the pedicels as long or longer; seed concave, 3 costate, one or all of the corresponding

wings developing; vittæ 4-5 in the intervals, 8 upon the commissure.—Whole plant purplish; near *C. terebinthinus*, Nutt. New Mexico (Palmer, 1869). Northern Arizona (Mrs. E. P. Thompson). In damp, shaded soil; March.

PRUCEDANUM NEWBERRYI.—Acaulescent or nearly so, glabrous or somewhat viscid-pubescent; leaves ovate or oblong in outline, 1-2' long, shorter than the petioles, pinnately 3-foliolate; upper leaflet 3-lobed, the lower 2-lobed and sessile, lobes sparingly incised; peduncle exceeding the leaves; umbel naked, unequally 4-8-rayed; involucls foliaceous and unilateral, the 4-8 very unequal segments oblong, acute or obtuse, mostly exceeding the flowers; calyx-teeth ovate to linear-lanceolate, acute; petals yellow; disk broad; fruit glabrous, ovate, exceeding the short pedicels.—Remarkable for its conspicuous foliaceous involucls. Fruit immature, but sufficiently grown to show its character. New Mexico (Dr. Newberry, on the Mexican Boundary Survey); Northern Arizona, on stony soil (Mrs. E. P. Thompson). April.

ANGELICA WHEELERI.—Tall and stout, roughly puberulent; leaves biternate; leaflets ovate-oblong, 2-3' long, acute, incisely serrate, the teeth broad and mucronulate, middle leaflet petiolulate; involucre and involucls none; rays numerous, unequal, becoming 2-5' long; pedicels and ovary hispid; petals apparently white; fruit broad-elliptical, 3' long, subpubescent, the dorsal wings thick, narrower than the lateral ones.—Utah (Wheeler).

GARRYA FLAVESCENS. (*Garrya* —?, Watson, *King's Rep.* 5, 421).—Pubescence silky, appressed; leaves elliptic-oblong, 1-2½' long, acute at each end, entire, glabrate above, margin revolute; petioles 3-6" long; aments pendulous; bracts 6-10 pairs, broad-ovate, connate, foliaceous, acute or the lower acuminate; sterile aments 1-2' long, loose, the flowers (1-3 together) on pedicels equaling or exceeding the bracts; fertile aments 1' long, dense, with solitary flowers and densely pubescent fruit.—Frequent from Southern Nevada and Utah to Arizona and New Mexico; growing 5-8° high, and flowering in March.

BRICKELLIA (CLAVIGERA) LONGIFOLIA.—Slightly scabrous, very slender, with spreading branches; leaves 2-5' long, linear, acuminate, entire or obscurely sinuate-toothed, flat with scabrous margins, 3-nerved; punctulate; flowers on short slender pedicels, axillary and in small terminal clusters; involucre glabrous, 2" long, the spreading scales acutish, or the linear inner ones obtuse or truncate; achenium 10-striate, slightly and minutely hairy on the angles, nearly 1" long, the soft minutely barbate pappus but little longer.—Southern Nevada (Wheeler); Northern Arizona (Mrs. E. P. Thompson). In a damp cañon; April.

HAPLOPAPPUS CERVINUS.—Low, 6' high, suffruticose, resinous-scabrous, the short herbaceous stems leafy to the top; leaves oblong-lanceolate, 4-6" long, shortly cuspidate, attenuate to the base, entire, subsabrous, 3-nerved; heads 3-4" long, in 3-5-flowered terminal corymbs; outer scales linear, acuminate, with setaceous spreading tips, the inner chartaceous, acutish, with scarious lacerated margins, erect, nearly equaling the pappus; rays few, narrow and short; style exserted; achenia linear, pubescent.—Nearest to *H. suffruticosus*, Gray. Antelope Cañon, Utah (Wheeler).

LAPHAMIA MEGALOCEPHALA.—Scabrous-pubescent; stems diffusely branched, 1° high; branches simple; leaves alternate, broadly ovate, 2-3" long, smaller upon the branches, entire, very shortly petioled; heads large, 2-3" in diameter, terminal and solitary, discoid, many-flowered; achenia compressed, hispid; pappus none.—With nearly the habit of *L. Stansburii*, Torr. Nevada (Wheeler).

VIGUIERA RETICULATA.—White-tomentose; stems herbaceous; leaves subopposite, coriaceous and rigid, broad-ovate, 1-2' long, cordate at base, acute, entire, shortly petioled, strongly reticulated beneath; bracts small, lanceolate; heads 4-5 together in short close corymbs; involuclal scales imbricated in 3-4 series, lanceolate, thick, appressed or with spreading tips; rays entire; receptacle shortly conical; chaff acutish; achenia silky, the pappus-awns subulate at base, the scales lacerate.—Telescope Mountain, Southeastern California (Wheeler).

CHÆTADELPHA * *WHEELERI*, Gray MS.—Stems numerous, 1° high, flexuous; leaves

* *CHÆTADELPHA*, Gray MS. (New Genus of *Cichoraceæ*). Heads about 5-flowered. Involucre cylindrical, of 5 linear 1-nerved scales in a single row and several small imbricated scales at base. Receptacle naked. Ligules short. Achenia linear, glabrous, 5-angled, somewhat striate between the prominent angles, slightly thickened upward. Pappus of a single row of

linear-lanceolate, 1-2' long, acute, entire, rather rigid; flowers apparently rose-color; involucre 6'' long, shorter than the brownish pappus; achenia 3-4'' long.—With the habit of *Lygodesmia juncea*. Southern Nevada (Wheeler).

GILIA (NAVARRERIA) DEBILIS.—Slender, 1-2' high, leafy above; pubescence minute or hirsute; leaves alternate, $\frac{1}{2}$ -1' long, oblong, attenuate into a short petiole, entire, or some of them broader and 3-lobed; bracts entire, resembling the leaves, twice longer than the calyx; flowers nearly sessile; calyx-teeth ovate-triangular, shorter than the tube; corolla funnel-form, 8'' long, with elongated tube and deeply lobed limb, light-purple; the stamens upon the throat, exerted; capsule 1'' long, the cells 1-seeded; seeds without mucilage or spiracles.—Utah (Wheeler). Without the pinnatifid pungent lobing of the leaves and bracts which is usual in the section.

CONVOLVULUS LONGIPES.—Glabrous, glaucous, twining; leaves linear, 1' long or less, entire or auricled at base, petioled; peduncles elongated, 2-6' long, mostly strict, 2-3-bracted, usually 1-flowered; bracts linear; calyx-lobes rounded, obtuse or emarginate; corolla funnel form, 1 $\frac{1}{4}$ ' long, yellowish.—Southern Nevada (Wheeler).

FRAXINUS CORIACEA.—Leaflets 3-5, coriaceous, obovate or oblong, 1-2' long, truncate or rounded at the apex or acutish, attenuate or abruptly contracted at base, sparingly toothed, mostly rather long-petiolulate, glabrous, or with the petioles pubescent when young; fruit 1' long, terete at base, widening into an oblong obtuse wing; calyx persistent.—Ash Meadows, Nevada (Wheeler), and Devil's Run Cañon, Arizona (Bigelow), on the Mexican Boundary Survey.

OXYBAPHUS GLABER.—Glabrous; panicle large and open; bract-leaves oblong, sessile; flowers solitary, on slender pedicels 2-3'' long, becoming deflexed; involucre 1-flowered; calyx shorter than the involucre; fruit glabrous, oblong, strongly tuberculate between the prominent ribs.—Lower leaves not collected but the species is otherwise strongly marked; fruit much as in *O. glabrifolius*. Kanab, Utah (Mrs. E. P. Thompson). In dry soil; October.

ABRONIA VILLOSA.—Pubescence more or less densely villous, subglandular, spreading; stems weak and slender; leaves $\frac{1}{4}$ -1' long, oblong or ovate, obtuse or acutish, attenuate into a slender petiole; heads 5-10-flowered; involucre scales narrowly lanceolate, long-acuminate, 3-4'' long; flowers pink, the lobes obcordate with a deep sinus; fruit with a firm body, strongly reticulate-pitted, the 3-5 broad wings consisting of a simple lamina, usually truncate above.—Nearest to *A. umbellata*. Arizona (Wheeler).

ERIOGONUM THOMPSONÆ. (§ *Corymbosa*).—Branches short, subwoody, ascending, leafy, bearing a long naked peduncle; stem, petioles and under surface of the leaves white-tomentose, otherwise glabrous; leaves broad-oblong, 1 $\frac{1}{2}$ ' long, acute at each end, long-petioled; scape 1' high, rigid, repeatedly trichotomous above, and tribracteate at the nodes; involucre 5-toothed and strongly 5-angled; flowers yellow, naked, the segments of the perigonium nearly equal.—Whole plant yellowish. Sand-cliffs near Kanab, Utah (Mrs. E. P. Thompson). September.

QUERCUS UNDULATA, Torr.—The common low oak of the Rocky Mountains and Wahsatch, ranging southward to New Mexico and Southern Utah. An examination of considerable material shows that it is quite variable in its foliage and includes several reputed species and forms. The typical form has oblong leaves with acute or acutish entire divaricate mostly triangular lobes, the sinuses reaching half-way to the midrib. This is also *Q. Fendleri*, Liebm. With large leaves and the lobes sometimes coarsely notched it becomes *Q. Gambellii*, Nutt., and *Q. Douglasii*, var. *Neo-Mexicana*, A. DC. With the lobes more obtuse it is *Q. alba*, var. (?) *Gunnisoni*, Torr.; and with the lobes less divaricate and more oblong, frequently notched at the apex, and the rounded or narrow sinuses reaching often nearly to the midrib, it is the more prevalent northern form, *Q. obtusiloba*, var. *depressa*, Nutt., and var. *Utahensis*, A. DC. The extreme states appear quite distinct, but intermediate forms abound and there seems to be nothing in the flowers or fruit to distinguish them.

SALIX NEVADENSIS.—Aments short, 6-8'' long, appearing with the leaves, ascending on leafy peduncles; scales oblong, obtuse, glabrous, or subsilky in the male aments, light-colored; stamens 3, free; capsules glabrous even when young, on pedi-

barbulate bristles, those at the angles stout and rigid, the few intermediate ones shorter, capillary and more or less united to them.—A smooth, diffusely branched, herbaceous perennial, with alternate leaves and solitary terminal flowers.

cels $\frac{1}{2}$ " long; style none; stigmas short and thick; leaves lance-linear, $\frac{1}{2}$ -1' long on flowering specimens, acuminate, entire, silky-tomentose; stipules very minute.—A slender shrub, 3-4' high, with light-colored bark and yellowish foliage, growing in dry sandy soil. It differs from *S. Hindsiana* in its more reduced habit, its silvery pubescence, narrower, more scarious, lighter-colored and glabrous scales, more slender and smoother capsules, and thicker and shorter stigmas. At the base of the Washoe Mts., near Carson City (1093 Watson), and in Central Nevada (Wheeler).

CALOCHORTUS AUREUS.—Low, 4-6' high, with a single linear carinate radical leaf, 3-4' long; scape short, 1-2-flowered, the single pair of bracts linear, 2' long; sepals greenish-yellow, with a dark-purple spot near the base, oblong- or ovate-lanceolate; petals broadly cuneate, 15" long, bright-yellow, with a small well-defined circular densely hairy gland near the base and a lunate purplish spot above it; young capsule narrowly oblong, not winged.—On sand-cliffs, Southern Utah (Mrs. E. P. Thompson); June.

CALOCHORTUS FLEXUOSUS.—Branched and flexuous above; bracts alternate, $\frac{1}{2}$ -1 $\frac{1}{4}$ ' long, linear-lanceolate, carinate, rather rigid; sepals oblong-lanceolate, greenish with a deep-purple and orange spot at base; petals broadly cuneate, 12-15" long, purplish, with a deep-purple claw and an ill-defined circular orange or purple gland above, the glandular hairs extending laterally to the margin; capsule triangular, narrowly oblong.—Southern Utah and Northern Arizona (Mrs. E. P. Thompson); April and May. The bulbs, as of other species, are eaten by the Indians.

ANDROSTEPHIUM BREVIFLORUM.—Scapes 6' high; umbels 4-7-flowered, the pedicels 6-15" long; perianth violet, 6-7' long, the nearly erect lanceolate segments equaling the campanulate tube; corona 3" long; capsule triangular-globose, 3" in diameter.—A stouter plant than *A. violaceum*, with much smaller flowers. Southern Utah and Northern Arizona (Mrs. E. P. Thompson); April and May. Bulbs also eaten.

ON THE DATES OF PROFESSOR COPE'S RECENT PUBLICATIONS.*

BY PROF. O. C. MARSH.

DURING the past year Dr. Leidy, Prof. Cope, and myself have been investigating the fossil vertebrates of the Eocene of Wyoming, and our material has not unfrequently included the same species. Our descriptions have usually been published as separate papers, issued in advance of the journals containing them. To prevent, if possible, any question about priority of publication I agreed with each of these authors in March, 1872, that we should send to each other, on the day of publication, any papers on the above subject we might issue, the date of publication to be either printed or written on each pamphlet. This would ordinarily secure the receipt of the papers on the following day, and we agreed to accept this receipt, so far as we were individually concerned, as

* Communicated to the Philadelphia Academy of Natural Sciences, April 8th, 1873.